

## Study guide for Critical Thinking final

### *How We Acquire Our Beliefs*

#### Overview

- Origins of beliefs: collective experiences of ancestors rather than genes
- Power of beliefs: originate in our culture and have the ability to endure and pervade our lives
- Controversial Beliefs: Examples include genetically modified crops, climate change and fracking
- How to combat beliefs: Skepticism and critical thinking are needed to confirm beliefs
- Role of England in combatting beliefs: provide educational freedom that promotes critical thinking, idea of freedom began in 1215 with the Magna Carta Libertatum, the Great Charter of the Liberties of England. British law therefore allowed for personal liberty, free contract, jury trials, uncensored news, regulated elections, habeas corpus, open competition, secure property and universal suffrage. Many countries still do not have these freedoms.

#### GM food

- Allows for farmers to produce crops more affordably and sustainably while providing for food security
- Seeds developed in laboratories and tested to enhance nutrition and resistance to environmental factors such as drought.
- Genetically modified crops are on 25% of farmland, used by 17.3 million farmers. 90% of those farmers are in developing nations
- Billions have consumed GM crops for over 20 years with no recorded problems by any respected scientific organization
- GM crops resistant to insects have allowed India to export cotton, with worldwide decrease of 25% in demand for insecticide
- Herbicide tolerant crops have allowed for no-tillage farming, reduced soil erosion and reduced greenhouse gas emission
- Fear of GM crops persist with Luddites (people opposed to industrialization and other technologies)
- Historically, Luddites have protested labor machinery while they now oppose biotechnology
- Politics and ideologies are at the root of the fear of GM crops
- For example, Zambia refused a donation of GM corn, even though the country was starving
- Concerns about GM food have tightened regulations in the US to test for molecular characterization, toxicological evaluation, allergenicity assessments, compositional analysis and feeding studies. molecular characterization, toxicological evaluation, allergenicity assessments, compositional analysis and feeding studies. These tests take 5-10 years and tens of millions of dollars.

#### Role of Culture

- Elements of culture such as ideas, beliefs, stories, songs, art and technology are transferred generationally. This elements were named *memes* by Richard Dawkins in 1976.
- Memes analogous to genes in their role in evolution

- Differences between genes and memes: memes are faster and more efficient, able to be transmitted from one person to another without genetics.
- Memes are transmitted observationally as shown by Bandura in his Bobo doll study in which children watched an adult be violent towards a clown doll and were later violent themselves to the doll.

#### Formation of Learning Beliefs

- Bandura led to a paradigm shift away from Pavlovian and Skinnerian behaviorism (learning based on repetition and reward)
- Hence, Bandura founded cognitive learning theory based on the idea that only observation is needed for learning to occur.
- Structurally, brain builds circuits and synaptic connections to create memories. When those are damaged, as with Alzheimers, identity is lost.

#### Memory

- Eric Kandel received 2000 Nobel Prize on physiological basis of memory storage in neurons
- Kandel studies Aplysia, a type of sea slug with large nerve cells. He used *radical reductionism* (belief that complex phenomena is best studied in simple organisms) to study memory.
- Found that learning mechanisms and storage of long-term memory highly similar between slugs and more complex animals.
- When memories form there is a physical change in the distribution of synaptic connections
- Synapse assembly: groups of novel synapses formed with new learning associations
- En passant synapses: synapses formed along axons rather than dendrites

#### Narration

- stories are a necessity to the human species
- Narrative fallacy: inability to see facts without adding a story to the sequence, therein making a logical link or a relationship. These explanations do help us to remember and make sense of events. However, they also fool people into thinking they understand non-existent relationships. Judgement becomes a problem because the human brain is programmed to organize and synthesize information.

#### Role of Dopamine

- Dopamine reduces skepticism in its activation of perception with unfamiliar information
- Patternicity: synthesizing perceptions into meaningful patterns
- Dopamine increases patternicity and lowers skepticism
- With dopamine comes heightened vulnerability to fads such as astrology, superstitions and gambling.

#### Critical Periods

- Criticals periods demonstrate that learning occurs in three waves. First senses, then language and finally higher cognition is learned.
- Successive waves allow for increasingly complex skills

#### ***Cigarettes, Alcohol and Marijuana as Gateways to Addiction***

#### Overview

- Addiction blocks critical thinking, preventing learning.

-Genetics account for 50% of the vulnerability to addiction while environmental factors such as stress account for the other 50%.

### Cigarettes

-1.3 billion people abuse tobacco worldwide

-Nicotine originally used as an insecticide

-Nicotine in one cigarette could kill a human if directly injected into the bloodstream

-Nicotine responsible for 5.4 million deaths a year followed by alcohol at 2.5 million

-Nicotine exposure in adolescence increases susceptibility to neuropsychiatric and addiction disorders.

-Nicotine upregulates its receptors, the opposite of most drugs.

-Alcohol and Cigarettes take much longer to quit than drugs such as cocaine or marijuana, with an average of 30 versus a few years.

-Electronic cigarettes vaporize nicotine while being flavored with child-directed flavors such as gummy bear.

### Alcohol

-Dr David Nutt claimed alcohol the most dangerous drug to society

-Dr. Nutt believes that by replacing alcohol with benzodiazepines, users would still have reduced anxiety. While this replacement is just as addictive, it is not as harmful.

-Dr. Nutt also believes electronic cigarettes could save 5 million lives a year.

-World consumed 6.1 liters of pure alcohol per person in 2005. Countries that drank the most included Moldova (18.2 liters per person) and the Czech Republic.

-Home-brewed liquor accounts for 30% of world drinking.

-In Russia 1 out of 5 male deaths is caused by alcohol.

-Pros of drinking: moderate drinkers have better health than both heavy drinkers and abstainers. Could be due to other factors though such as a moderate life.

-Cons of drinking: carcinogenic, mutagenic, teratogenic and toxic

-Study found that even low to moderate alcohol consumption was associated with a 13% increase in risk for certain cancers. Each additional drink per day increased chances of cancer by 15 per 1000 woman.

-Alcohol reduces number of hippocampal neurons which can impact sensory, motor or learning processes. This is most impactful in fetuses still in utero.

-Children exposed to alcohol prenatally have aspects of fetal alcohol syndrome, the leading cause of mental retardation, such as thinner corpus callosums and impaired development. Additionally, children had lower IQs, heart conditions, head and face abnormalities and neurological problems.

-500,000 women in US report drinking during pregnancy, with 20% of those reporting binge drinking.

-*Great White Commissure*: extreme damage seen to tissue in teens that engaged in heavy alcohol or marijuana consumption. The tissue allows for quick and efficient communication between brain regions. With the compromised tissue comes slower cognitive processing in fields such as memory and attention.